

Original Research Article

Effect of police training during the confinement period on some cardiopulmonary and hematological parameters in Khartoum, Sudan

Ahmed O. Ahmed¹, Isam M. Abdallah², Ibrahim A. Ali¹, Omer A. Musa^{1*}

¹Department of Physiology, Faculty of Medicine, The National Ribat University, Khartoum, Sudan

²Department of Physiology, Faculty of Medicine, Gezira University, Khartoum, Sudan

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*Correspondence:

Dr. Omer A. Musa,

E-mail: omusa56@yahoo.co.uk

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ABSTRACT

Background: Pulmonary function tests (PFT) serve as a tool of health assessment and as a predictor of occupational fitness. Police officers must develop and maintain high levels of physical fitness for physical demanding tasks they perform. The training program starts with confinement of five to eight weeks according to the trainee. Previously it has been shown that the police students have better lung functions values compared to their civilian colleagues. In this study the effect of the confinement training on pulmonary function tests was investigated.

Methods: Eighty one policemen trainee were randomly selected from a new batch in the faculty of police sciences and Law, the National Ribat University, Khartoum, Sudan at their starting confinement period. Subjects were medically fit with no history of Diabetes, Hypertension, Asthma or use of any long term medications. Pulmonary function tests (FVC, FEV₁ and PEFR) were performed using a micro-plus spirometer. Blood pressure, pulse rate, and hemoglobin were measured. All these were repeated at the end of the confinement.

Results: The age of participants ranged from 24 to 26 years. FVC, FEV₁ and PEFR significantly increased after the confinement period. The blood pressure and the pulse significantly decreased. The weight of the participants decreased after the confinement but Hb significantly slightly increased.

Conclusions: Regular police training during the confinement improved the pulmonary and cardiovascular reserve function.

Keywords: FVC, FEV₁, Hb level in police training, PEFR

INTRODUCTION

Police training in the faculty of police sciences and law starts by a period of confinement then continues till graduation. The confinement period extends up to eight weeks in which there are six hours daily of different exercises which continue with three hours daily during the training period, with the objective to increase the endurance of the students for their future job. In a previous study comparing the cardiopulmonary parameters of the police students with the civilian

students it has been found that all pulmonary functions parameters (FVC, FEV₁, PEFR) and respiratory muscles power (MEP, MIP) were significantly higher in police students. The blood pressure and pulse were lower while haemoglobin was higher.¹ It has previously been shown that exercise improves lung function in athletes and security force trainees.²⁻⁴

Good aerobic capacity and muscle strength are important to perform the activity that is required from professional soldiers and officers trying to optimize their peak

performance and to carry out their daily activities. Adequate aerobic and muscle fitness, regular and sufficient function physical training, are essential to prevent overweight/obesity and so maintain body behavior and mental well-being. All of these elements are also associated with a better quality of life.⁵

The aim of this study was to investigate the effects of the confinement training of male police force on the spirometric lung function test parameters, res, blood pressure, pulse and hemoglobin.

METHODS

A cross sectional descriptive study was conducted during September to December 2017 in the faculty of police sciences and law, National Ribat University, Khartoum, Sudan. Eighty one healthy male subjects, non smokers with no recent or previous history of respiratory diseases were included after taking their consents. Age (age was recorded from birthday by calendar to the nearest of year±6 months); Height (standing height was recorded without shoes on a wall mounted measuring tape to the nearest of centimeters±5cm); weight (weight was recorded without shoes on weighting scale with a least count of 500grams).

The pulmonary function tests (PFT) were carried out using portable spirometer. The pulmonary function tests were repeated three times for each subject each time and the best result was selected for analysis. Each subject was made to relax for 5 minute prior to performing the PFT procedure. The following parameter were recorded in Test: forced vital capacity (FVC), forced expired volume in first second (FEV1), FEV1/FVC ratio and peak expiratory flow rate (PEFR).

Measurement of BP was performed by using sphygmomanometer, according to WHO guidelines in a sitting position after the participant rested for at least 5 min, while pulse rate by placing index and middle finger to the wrist about 0.5-1 inch proximal to the wrist joint, in line with the index finger checking radial artery. One pulsation felt, counting the number of beats for one minute. Blood samples (2-3ml) were collected into vacutainer tubes for Hb assay by colorimetry.

RESULTS

The Study was conducted on 81 males undergoing confinement policeman training. The mean age was 25.54±1.65 and ranged from 22 to 29 years. All the study subjects were medically fit with no history of Diabetes, Hypertension, Asthma or use of any long term medications. 4 (4.9%) were smokers and have been excluded.

The mean of PEFR significantly increased from 473.6 before the training to 498.0 after the training (Table 1), (Figure 1).

FVC and FEV1 significantly increased after the confinement period from (3.38±1.04) and (3.04±0.78) to (3.56±0.72) and (3.40±0.68) Respectively (Table 1) (Figure 2) (Figure 3).

Table 1: Effects of police confinement training on pulmonary function parameters, blood pressure, pulse and haemoglobin.

Total no of patients 81			
Parameters	Before training (mean±SD)	After (mean±SD)	*P-Value
PEFR. L/min	473.6±165.44	498.05±38.24	0.01
FVC. L	3.38±1.04	3.56±0.72	0.00
FEV1. L	3.04±0.78	3.40±0.68	0.09
Hb. g/dl (mean (sd))	11.75±0.89	11.88±0.97	0.09
Systolic BP mmHg	117.40±9.05	103.75±8.58	<0.001
Diastolic BP mmHg	80.27±7.62	75.04±4.92	<0.001
Pulse Rate. beat/min	84.74±13.49	73.74±10.29	<0.001

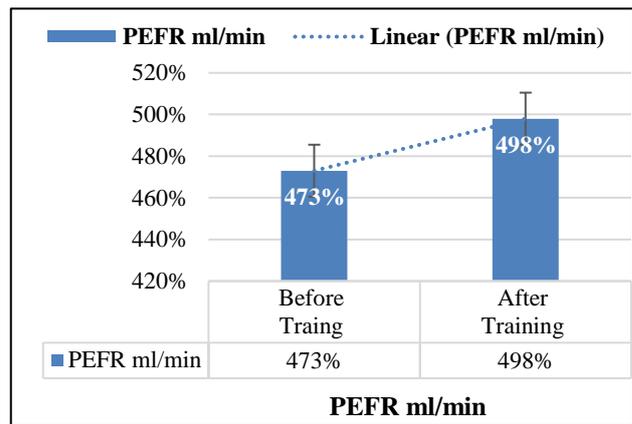


Figure 1: PEFR before and after confinement training.

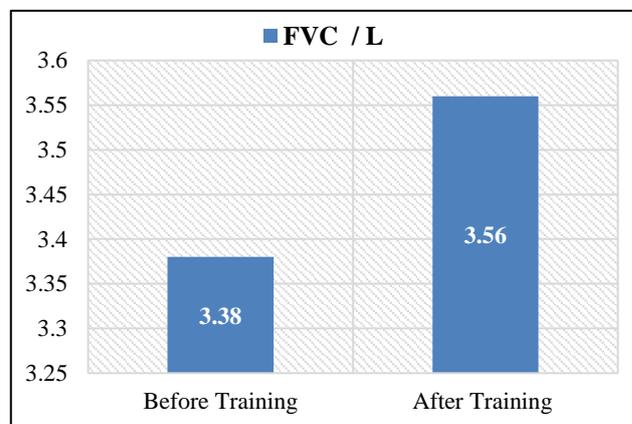


Figure 2: FVC before and after confinement training.

The systolic and diastolic blood pressure significantly decreased after the confinement from (117.40± 9.05) and (80.27±7.62) to (103.75±8.58) and (75.04±4.92) Respectively. (Table 1) (Figure 4). Also the pulse rate of the participants was decrease after confinement from 84.7 bpm to 73.7 bpm. (Table 1) (Figure 5). The weight of the participants decreased after the confinement but Hb significantly slightly increased. (Table 1) (Figure 6).

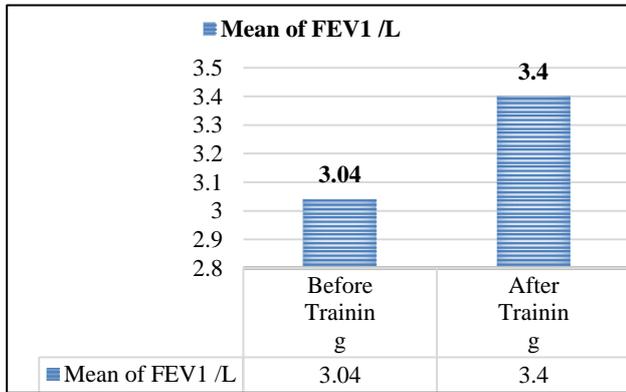


Figure 3: FEV1 before and after confinement training.

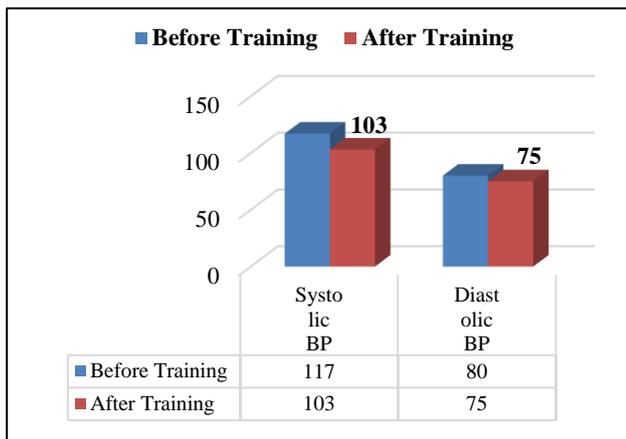


Figure 4: Mean of blood pressure before and after confinement training.

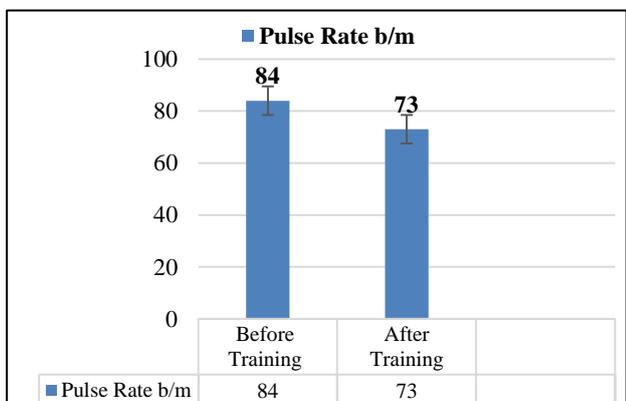


Figure 5: Pulse rate before and after confinement training.

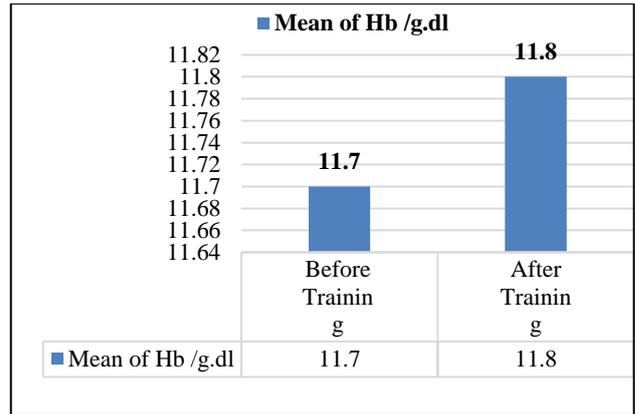


Figure 6: Mean of Hb level before and after confinement training.

DISCUSSION

This study showed that the values of FVC, FEV1 and PEFR were significantly higher in police students after the confinement training when compared to those before the training. These findings did not differ from those reported in the literature. It was revealed by Thaman et al. that significantly higher values of FVC, FEV1 and PEFR, were obtained in border security force trainees in India after training period of 9 months duration.² Different studies have confirmed that physical training improved lung function.⁵⁻⁷ Malhotra et al. 1972 observed that there was significant difference in PEFR in Indian athletes and non-athletes Indian soldiers, thereby showing that there is no difference in the flow rates in top Indian athletes and moderately trained soldiers.⁸ The physical training that the police trainees undergo must have helped in developing reduced resistance to respiration and greater endurance in respiratory muscles, accounting for increased FVC, FEV1 and PEFR. This is advantageous for physical work capacity in them.^{5,6}

The effects of police force training on cardiovascular system showed significant decrease in systolic (P=0.001) and diastolic blood pressure (P=0.001) during rest in police students. Ohkubo showed the effects of exercise in older adults and found that there were decrease in systolic blood pressure by 12.29mmHg and diastolic blood pressure by 4.61mmHg during rest after 5 weeks of exercise training.⁹ The mean of pulse rate was significantly lower in police students. Generally, the greater the physical fitness of an individual, the slower the heart rate at rest. Resting heart rate can decrease significantly following training in a previously sedentary individual.^{10,11}

CONCLUSION

The confinement training period has improved the pulmonary functions parameters and the reserve cardiac parameters with slight increase in Hb and is adequate for

preparing the police students for the whole program of training.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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